

Appl. No. 10/615,727
Amd. Dated May 31, 2005
Reply to Office Action of December 1, 2004

Amendments to the Claims:

1. (Currently amended) A prosthesis to replace a cephalad portion of a left natural facet joint on a vertebral body and a cephalad portion of a right natural facet joint on the vertebral body, the prosthesis comprising

left and right prosthesis bodies accommodating fixation to the vertebral body at or near respective left and right pedicles without support of a lamina,

an artificial left facet joint structure on the left prosthesis body adapted and configured to replace a cephalad portion of the left natural facet joint after removal of a portion of the vertebral arch, and

an artificial right facet joint structure on the right prosthesis body adapted and configured to replace a cephalad portion of the right natural facet joint.

2-5. (Cancelled)

6. (Original) A prosthesis according to claim 1 wherein at least one of the left and right artificial facet joint structures includes means for replacing a cephalad portion of a respective one of the left and right natural facet joints after removal of the cephalad portion of the respective natural facet joint from the vertebral body.

7. (Original) A prosthesis according to claim 1 wherein the left and right artificial facet joint structures include means for replacing a cephalad portion of the left and right natural facet joints after removal of the cephalad portion of the left and right natural facet joints from the vertebral body.

8. (Withdrawn) A prosthesis according to claim 1 further including a third artificial facet joint structure on one of the left and right prosthesis bodies superior to the respective one of the artificial left or right facet joint structures adapted and configured to replace a caudal portion of a natural facet joint formed by a vertebral body.

9. (Withdrawn) A prosthesis according to claim 8 wherein the third artificial facet joint structure includes means for replacing a caudal portion of a natural facet joint after removal of the caudal portion of the natural facet joint from the vertebral body.

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10. (Original) A prosthesis according to claim 1

wherein at least one of the left and right artificial facet joint structures includes means for replacing a cephalad portion of at least one of the left and right natural facet joints after removal of at least one inferior articular process and at least a portion of a lamina from the vertebral body.

11. (Original) A prosthesis according to claim 1

wherein the left and right artificial facet joint structures include means for replacing a cephalad portion of the left and right natural facet joints after removal of left and right inferior articular processes and at least a portion of a lamina from the vertebral body.

12. (Withdrawn) A prosthesis according to claim 8

wherein the third artificial facet joint structure includes means for replacing a caudal portion of a natural facet joint after removal of at least a portion of a mamillary process, or an accessory process, or part of a transverse process, or part of a pedicle from the vertebral body.

13. (Original) A method of replacing, on a vertebral body, a cephalad portion of a

left natural facet joint and a cephalad portion of a right natural facet joint using the prosthesis as defined in claim 1 to provide improved support for the spinal column, the method comprising the steps of

(i) removing the cephalad portions of the left and right natural facet joints from the vertebral body, and

(ii) after step (i), fixing the prosthesis as defined in claim 1 to the vertebral body to replace both removed cephalad portions of the first and second natural facet joints with the first and second artificial facet joint structures.

14. (Original) A method according to claim 13

wherein the removing step includes removing left and right inferior articular processes and at least a portion of a lamina from the vertebral body.

15-31. (Cancelled)

32. (Withdrawn: Copied from US 6,419,703, Claim 1) A prosthesis for the replacement of a posterior element of a natural vertebra wherein the natural vertebra comprises a natural vertebral body, a pair of natural pedicles extending from the natural vertebral body, a natural lamina extending

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from the two natural pedicles, a pair of natural superior facets extending from the two natural pedicles and the natural lamina, a pair of natural inferior facets extending from the natural lamina, a natural spinous process extending from the natural lamina, and a pair of natural transverse processes extending from the two natural pedicles, said prosthesis comprising:

a pair of prosthetic mounts;

a prosthetic lamina extending from said two prosthetic mounts;

a pair of prosthetic superior facets extending from said two prosthetic mounts and said prosthetic lamina; and

a pair of prosthetic inferior facets extending from said prosthetic lamina.

33. (Withdrawn: Copied from US 6,419,703, Claim 23)). A method for replacing a posterior element of a natural vertebra, wherein the natural vertebra comprises a natural vertebral body, a pair of natural pedicles extending from the natural vertebral body, a natural lamina extending from the two natural pedicles, a pair of natural superior facets extending from the two natural pedicles and the natural lamina, a pair of natural inferior facets extending from the natural lamina, a natural spinous process extending from the natural lamina, and a pair of natural transverse processes extending from the two natural pedicles, said method comprising the steps of:

making a resection at the most dorsal aspect the two natural pedicles; and

attaching a prosthesis to the resected vertebra, said prosthesis comprising a pair of prosthetic mounts, a prosthetic lamina extending from said two prosthetic mounts, a pair of prosthetic superior facets extending front said two prosthetic mounts and said prosthetic lamina, and a pair of prosthetic inferior facets extending from said prosthetic lamina.

34. (Currently Amended: Copied from US 6,579,319, Claim 1) A prosthesis for the replacement of at least a portion of the bone of a facet located on a mammalian vertebra, comprising: a surface that articulates with another facet; a bone contacting surface that contacts one of an exterior surface or a resected surface of said vertebra, said surface that articulates being connected to said bone contacting surface; a fixation element that attaches said bone contacting surface to said vertebra, said fixation element being adapted for implantation into an interior bone space of a pedicle of said vertebra; and wherein said prosthesis is configured so that no portion of said prosthesis contacts [the posterior arch] the lamina of said vertebra.

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35. (Previously Presented: Copied from US 6,579,319, Claim 2) The device of claim 34 wherein said fixation element is a screw.

36. (Previously Presented: Copied from US 6,579,319, Claim 3) The device of claim 34 wherein said surface that articulates is connected to said bone contacting surface that contacts one of said exterior surface or said resected surface of said vertebra, wherein said bone contacting surface is porous coated to allow for bone ingrowth.

37. (Currently Amended: Copied from US 6,579,319, Claim 4) A prosthesis for the replacement of at least a portion of the bones of opposed and articulating facets located on a mammalian vertebra, comprising: an inferior component adapted to be attached to a first vertebra; and a superior component adapted to be attached to a second vertebra; where the first vertebra is adjacent and superior to the second vertebra; and where one of said inferior and superior components includes: a flange that connects to one of an exterior surface or a resected surface of said vertebra; and a fixation element that attaches said flange to said vertebra, said fixation element being adapted for implantation into an interior bone space of a pedicle of said vertebra; and further wherein said prosthesis is configured so that no portion of said prosthesis contacts [the posterior arch] the lamina of said vertebra.

38. (Previously Presented: Copied from US 6,579,319, Claim 5) A prosthesis according to claim 37 wherein said fixation element is a screw.

39. (Currently Amended: Copied from US 6,579,319, Claim 6) A method for replacing a facet of a mammalian vertebra, comprising the steps of: resecting at least a portion of the bone of said facet; attaching a prosthetic facet to the remaining bone of said vertebra with a fixation element implanted into an interior bone space of a pedicle of said vertebra such that no portion of the prosthetic facet contacts [the posterior arch] the lamina of said vertebra; where said prosthetic facet is adapted to articulate with another facet.

40. (Previously Presented: Copied from US 6,579,319, Claim 7) A prosthesis according to claim 39 wherein said fixation element is a screw.

41. (Currently Amended: Copied from US 6,579,319, Claim 8) A method for replacing a facet joint of a mammalian spine, comprising the steps of: resecting at least a portion of the bone of a first facet on a first vertebra; attaching a first prosthetic facet to the remaining bone of said first vertebra

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with a first fixation element implanted into an interior bone space of a pedicle of said first vertebra such that no portion of said prosthetic facet contacts [the posterior arch] the lamina of said vertebra; resecting at least a portion of the bone of a second facet on a second vertebra; and attaching a second prosthetic facet to the remaining bone of said second vertebra with a second fixation element implanted into an interior bone space of a pedicle of said second vertebra such that no portion of said prosthetic facet contacts [the posterior arch] the lamina of said vertebra; where said first prosthetic facet is adapted to articulate with said second prosthetic facet.

42. (Previously Presented: Copied from US 6,579,319, Claim 9) A prosthesis according to claim 41 wherein at least one of said first fixation element and said second fixation element is a screw.

43. (Previously Presented: Copied from US 6,579,319, Claim 10) A prosthesis according to claim 41 wherein said first fixation element and said second fixation element are both screws.

44. (Previously Presented: Copied from US 6,565,605, Claim 1) A prosthesis for the replacement of at least two facets located on a mammalian vertebra, comprising: at least one bone contacting surface that is adapted to be secured to a surface of the vertebra; at least two bearing surfaces for articulating with other facets, said at least two bearing surfaces being connected to said at least one bone contacting surface; and wherein no portion of said prosthesis is supported by the lamina of the vertebra.

45. (Previously Presented: Copied from US 6,565,605, Claim 2) The device of claim 44 further comprising fixation elements for securing said at least one bone contacting surface to the vertebra.

46. (Previously Presented: Copied from US 6,565,605, Claim 3) The device of claim 45 wherein said fixation elements are screws.

47. (Previously Presented: Copied from US 6,565,605, Claim 4) The device of claim 44 wherein said at least bone contacting surface is porous coated to allow for bone ingrowth.

48. (Previously Presented: Copied from US 6,565,605, Claim 5) The device of claim 47 wherein said porous coating includes at least one from a group comprising osteoinductive and osteoconductive substances.

49. (Previously Presented: Copied from US 6,565,605, Claim 6) The device of claim 44 wherein said bearing surfaces are formed from a material selected from the group consisting of a ceramic, a metal and a polymer.

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50. (Previously Presented: Copied from US 6,565,605, Claim 7) The device of claim 44 wherein said prosthesis is configured so that said at least two bearing surfaces are adapted to replace a pair of inferior facets.

51. (Withdrawn: Copied from US 6,565,605, Claim 8) The device of claim 44 wherein said prosthesis is configured so that said at least two bearing surfaces are adapted to replace a pair of superior facets.

52. (Withdrawn: Copied from US 6,565,605, Claim 9) The device of claim 44 wherein said prosthesis is configured so that said at least two bearing surfaces are adapted to replace an inferior facet and a superior facet.

53. (Withdrawn: Copied from US 6,565,605, Claim 10) The device of claim 44 wherein said prosthesis is configured so that said at least two bearing surfaces are adapted to replace a pair of inferior facets and a pair of superior facets.

54. (Previously Presented: Copied from US 6,565,605, Claim 11) A method for replacing at least two facets on a mammalian vertebra, comprising the steps of: resecting a pair of facets on the vertebra; and attaching a prosthesis to the vertebra so that a pair of bearing surfaces on the prosthesis are positioned in place of the resected facets, wherein the prosthesis is configured so that no portion of said prosthesis is supported by the lamina of the vertebra.

55. (Previously Presented: Copied from US 6,565,605, Claim 12) A method for replacing facets on two adjacent vertebra, comprising the steps of: resecting at least a bony portion of the inferior facets of a superior vertebra; attaching a first prosthesis that replaces said inferior facets of said superior vertebra; resecting at least a bony portion of the superior facets of an inferior vertebra; and attaching a second prosthesis that replaces said superior facets of said inferior vertebra; wherein no portion of said first prosthesis is supported by the lamina of said superior vertebra, and further wherein no portion of said second prosthesis is supported by the lamina of said inferior vertebra.

56. (Withdrawn: Copied from US 6,565,605, Claim 13) A method for replacing facets on three or more vertebra, comprising the steps of: resecting at least a bony portion of the inferior facets of a most superior vertebra; attaching a first prosthesis that replaces said inferior facets of said most superior vertebra; resecting at least a bony portion of the superior facets of a most inferior vertebra; attaching a second prosthesis that replaces said superior facets of said most inferior vertebra; resecting at least a bony portion of all of the facets of at least one intermediate vertebra located

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between said most superior vertebra and said most inferior vertebra; wherein, for each of said at least one intermediate vertebra, a prosthesis is attached that, replaces all facets of said intermediate vertebra.

57. (Withdrawn: Copied from US 6,565,605, Claim 14) A spinal implant kit for the replacement of facets, said implant kit comprising: one facet prosthesis adapted to replace two superior facets; one facet prosthesis adapted to replace two inferior facets; and one facet prosthesis adapted to replace two superior facets and two inferior facets.

58. (Previously Presented: Copied from US 6,565,605, Claim 15) A prosthesis for the replacement of a pair of spinal facets, said prosthesis comprising: a first vertical member having a first end and a second end, said first end being adapted for disposition against, and attachment to, a first pedicle of a vertebra, and said second end comprising a bearing surface for engagement with a facet of an adjacent vertebra; a second vertical member having a first end and a second end, said first end being adapted for disposition against, and attachment to, the other pedicle of the vertebra, said second end comprising a bearing surface with a facet of an adjacent vertebra; and a bridge connecting said second end of said first vertical member to said second end of said second vertical member.

59. (Previously Presented: Copied from US 6,565,605, Claim 16) The prosthesis of claim 58 wherein said first vertical member, said second vertical member and said bridge are formed so that said prosthesis is displaced from the lamina of the vertebra when said first end of said first vertical member is disposed against, and attached to, the first pedicle of a vertebra and said first end of said second vertical member is disposed against, the attached to, the other pedicle of the vertebra.

60. (Previously Presented: Copied from US 6,565,605, Claim 17) A spinal implant kit for the replacement of facets, said implant kit comprising: a superior facet prosthesis adapted to replace two superior facets; an inferior facet prosthesis adapted to replace two inferior facets; wherein no portion of said superior facet prosthesis is supported by a lamina of a vertebra; and wherein no portion of said inferior facet prosthesis is supported by a lamina of a vertebra.

61. (Previously Presented: Copied from US 6,565,605, Claim 18) A prosthesis for the replacement of a pair of spinal facets, said prosthesis comprising: a first vertical member having a first end and a second end, said first end being adapted for disposition against, and attachment to, a first pedicle of a vertebra, and said second end comprising a bearing surface for engagement with a

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facet of an adjacent vertebra; a second vertical member having a first end and a second end, said first end being adapted for disposition against, and attachment to, the other pedicle of the vertebra, said second end comprising a bearing surface with a facet of an adjacent vertebra; and a bridge connecting said first vertical member to said second vertical member; wherein said first vertical member, said second vertical member and said bridge are formed so that said prosthesis is displaced from the lamina of the vertebra when said first end of said first vertical member is disposed against, and attached to, the first pedicle of a vertebra and said first end of said second vertical member is disposed against, and attached to, the other pedicle of the vertebra.

62. (Presently amended: Copied from USPA 2003/0191532, Claim 1) A prosthesis for the replacement of at least a portion of the bone of a facet located on a mammalian vertebra, comprising: a surface that articulates with another facet surface; a fixation portion that is configured for implantation [implanted] into an interior bone space of said vertebra, said surface being connected to said fixation portion.

63. (Previously Presented: Copied from USPA 2003/0191532, Claim 2) The device of claim 62 wherein said fixation portion is a post that is adapted to be fitted into the interior bone space of a pedicle.

64. (Previously Presented: Copied from USPA 2003/0191532, Claim 3) The device of claim 63 wherein said post is porous coated to allow for bone ingrowth.

65. (Previously Presented: Copied from USPA 2003/0191532, Claim 4) The device of claim 64 wherein said porous coating includes osteoconductive or osteoinductive substances.

66. (Previously Presented: Copied from USPA 2003/0191532, Claim 8) The device of claim 62 wherein said surface that articulates is comprised of one of a group consisting of a polymeric bearing material attached to a metal substrate, a ceramic bearing material, and a metal bearing material.

67. (Presently amended: Copied from USPA 2003/0191532, Claim 9) A prosthesis for the replacement of at least a portion of the bone of a facet located on a mammalian vertebra, comprising: a surface that articulates with another facet; a bone contacting surface that contacts one of an exterior surface or a resected surface of said vertebra, said surface that articulates being connected to said bone contacting surface; a fixation element that attaches said bone contacting surface to said vertebra; and wherein said prosthesis is configured so that no portion of said prosthesis contacts [the posterior arch] the lamina of said vertebra.

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68. (Previously Presented: Copied from USPA 2003/0191532, Claim 10) The device of claim 67 wherein said fixation element is a screw.

69. (Previously Presented: Copied from USPA 2003/0191532, Claim 11) The device of claim 67 wherein said flange has a bone side adapted to contact one of said exterior surface or said resected surface of said vertebra, wherein said bone side is porous coated to allow for bone ingrowth.

70. (Previously Presented: Copied from USPA 2003/0191532, Claim 12) The device of claim 67 wherein said surface that articulates is comprised of one of a group consisting of a polymeric bearing material attached to a metal substrate, a ceramic bearing material, and a metal bearing material.

71. (Previously Presented: Copied from USPA 2003/0191532, Claim 13) A prosthesis for the replacement of at least a portion of the bones of opposed and articulating facets located on a mammalian vertebra, where said facets are diseased or traumatized, comprising: an inferior component adapted to be attached to a first vertebra and having a first fixation portion adapted to be implanted into a first interior bone space and a first articulation portion connected to said first fixation portion; a superior component adapted to be attached to a second vertebra and having a second fixation portion adapted to be implanted into a second interior bone space and second articulation portion connected to said second fixation portion; where the first vertebra is adjacent and superior to the second vertebra.

72. (Presently amended: Copied from USPA 2003/0191532, Claim 14) A prosthesis for the replacement of at least a portion of the bones of opposed and articulating facets located on a mammalian vertebra, comprising: an inferior component adapted to be attached to a first vertebra; and a superior component adapted to be attached to a second vertebra; where the first vertebra is adjacent and superior to the second vertebra; and where one of said inferior and superior components includes: a flange that connects to one of an exterior surface or a resected surface of said vertebra; and a fixation element that attaches said flange to said vertebra; and further wherein of said prosthesis is configured so that no portion of said prosthesis contacts [the posterior arch] the lamina of said vertebra.

73. (Presently amended: Copied from USPA 2003/0191532, Claim 15) A method for replacing a facet of a mammalian vertebra, comprising the steps of: resecting at least a portion of the bone of said facet; attaching a prosthetic facet to the remaining bone of said vertebra such that no portion of

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the prosthetic facet contacts [the posterior arch] the lamina of said vertebra; where said prosthetic facet is adapted to articulate with another facet.

74. (Presently amended: Copied from USPA 2003/0191532, Claim 16) A method for replacing a facet joint of a mammalian spine, comprising the steps of: resecting at least a portion of the bone of a first facet on a first vertebra; attaching a first prosthetic facet to the remaining bone of said first vertebra such that no portion of said prosthetic facet contacts [the posterior arch] the lamina of said vertebra; resecting at least a portion of the bone of a second facet on a second vertebra; and attaching a second prosthetic facet to the remaining bone of said second vertebra such that no portion of said prosthetic facet contacts [the posterior arch] the lamina of said vertebra; where said first prosthetic facet is adapted to articulate with said second prosthetic facet.